Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 4, 2017
Staff Name:	Uskov, Faiella	Time:	09:39
Reach ID (use map):	1	Weather (current):	Overcast,
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☐ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☐ Surface Flow Minimal (<0.5 l/s)
- ☒ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☒ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☒ Cropped Land	☒ Cropped Land	☒ Cropped Land
☐ Meadow	☐ Meadow	☐ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

Upstream section traverses through a mix of manicured grass and a pasture like area. This area has no defined feature and flows appear surficial from recent rains. Substrate is mainly grass, with some deposited silt. Water flows north through a 0.5 m plastic corrugated pipe under Uppers Lane. The feature becomes wider with minor definition but continues to exhibit shallow, swale-like features. The swale is cropped through. The swale is in a flooded state due to recent and ongoing heavy rains with moderate flows of approximately 0.3 m/s. Average wetted width in the downstream section is 0.85 m and feature width is 0.95 on average. Water depths are approximately 10.5 cm and substrate is made up of mainly clay with lesser amounts of silt and sand.

Photos: 3206, 3205, 3220, 3224

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 4, 2017
Staff Name:	Uskov, Faiella	Time:	10:19
Reach ID (use map):	2	Weather (current):	Overcast
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☐ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☒ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☒ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☒ Cropped Land	☒ Cropped Land	☒ Cropped Land
☐ Meadow	☐ Meadow	☐ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

No defined banks observed at the upstream section of this reach. Minor flows observed throughout. Substrate is comprised of clay and silt with lesser amounts of sand. Could not measure upstream wetted and feature width due to lack of definition. Reach became more defined in the downstream section near the property line to the north due to surficial runoff from agricultural field. Flows increased in the downstream section (~0.10 m/S). Wetted width is 0.5 m wide and feature width is 0.75 m wide.

Photos: 3231, 3234, 3235

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 4, 2017
Staff Name:	Uskov, Faiella	Time:	10:20
Reach ID (use map):	3	Weather (current):	Overcast,
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☐ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☒ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☒ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☒ Cropped Land	☒ Cropped Land	☒ Cropped Land
☐ Meadow	☐ Meadow	☐ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

No defined feature found in the upstream section. Minor surficial flows (~ 0.08 m/s) through a planted agricultural field. Water depths ranged from 0.05 to 0.08 m. Substrate is comprised mainly of clay, with lesser amounts of silt and sand. Feature becomes a poorly defined swale downstream, in which the landowner has attempted to plant. Feature is experiencing erosion due to increased water velocity and becomes more defined. Average wetted width in the downstream section is 1.0 m and feature width is approximately 1.15 m. Water depth is approximately 0.15 m. Substrate is comprised of mainly clay, sand and silt.

Photos: 3226, 3232, 3238, 3242

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 4, 2017
Staff Name:	Uskov, Faiella	Time:	11:04
Reach ID (use map):	4	Weather (current):	Overcast,
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☐ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☒ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☐ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☒ Cropped Land	☒ Cropped Land	☒ Cropped Land
☐ Meadow	☐ Meadow	☐ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

The survey started at the upstream section near an active farm and presumed pasture. It appears to originate in a large, pooled area of standing water due to runoff. No defined feature located. Very minimal flows observed in this area. Traversing northwest, the feature exhibits swale-like characteristics. Average wetted width ranges from 0.075 m to 0.85 m and the feature width ranges from 0.08 m to 1.0 m. Water depth ranges from 0.05 to 0.07 m and water velocity is estimated at 0.05 m/s. Substrate is mainly clay and silt with some patches of sand, gravel and cobble deposited on the surface of the underlying clay.

Photos: 3251-3271

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 4, 2017
Staff Name:	Uskov, Faiella	Time:	11:30
Reach ID (use map):	5	Weather (current):	Overcast
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☐ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☒ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☐ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☒ Cropped Land	☒ Cropped Land	☒ Cropped Land
☐ Meadow	☐ Meadow	☐ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

Minor definition of swale through field. The upstream wetted width is approximately 0.5 m wide and the feature width is approximately 0.6 m. Minimal flows. Moving downstream, the feature widens to approximately 0.6 m wetted width and 0.7 feature width. Flows were estimated at 0.04 m/s throughout this feature. Substrate is mostly silt and clay with sparse areas of cobble. The entire swale-like feature traverses through an active agricultural field that the farmer has planted with winter wheat.

Created: April 18, 2022

Photos: 3272-3280

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 4, 2017
Staff Name:	Uskov, Faiella	Time:	11:42
Reach ID (use map):	6	Weather (current):	Overcast,
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☐ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☒ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☐ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☒ Cropped Land	☒ Cropped Land	☒ Cropped Land
☐ Meadow	☐ Meadow	☐ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

In the upstream section of this swale, wetted width ranges from 1.0 m to 1.2 m and feature width ranges from 1.0 m to 1.5 m. Average water depth is 0.13 m and water velocity was estimated at 0.10 m/s. Little definition throughout this feature. Substrate in this feature is comprised mainly of clay with lesser amounts of silt with sparse pockets of cobble. Similar wetted width and feature width consistent between the upstream section and downstream section.

Created: April 18, 2022

Photos: 3282, 3285, 3289

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 4, 2017
Staff Name:	Uskov, Faiella	Time:	13:49
Reach ID (use map):	7	Weather (current):	Overcast,
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☐ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☒ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☐ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☐ Cropped Land	☐ Cropped Land	☒ Cropped Land
☒ Meadow	☒ Meadow	☐ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

Feature originates in lands upstream of Thorold Townline Road but the survey started at the road. Minimal flows (0.06 m/s) through a 0.5 m plastic corrugated pipe under Thorold Townline Road. This section flows through a small meadow before traversing through a planted agricultural field. Upstream wetted width ranges from 0.75 m and 0.85 m and feature width ranges from 0.75 m to 0.95 m. The downstream section widens slightly with feature widths ranging from 0.95 m to 1.1 m. Throughout, substrate is comprised mainly of clay and silt with sparse sand and small amounts of cobble.

Photos: 3384, 3386, 3380

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 4, 2017
Staff Name:	Uskov, Faiella	Time:	12:55
Reach ID (use map):	8	Weather (current):	Overcast
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☐ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☒ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☐ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☒ Cropped Land	☒ Cropped Land	☒ Cropped Land
☐ Meadow	☐ Meadow	☐ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

The survey started at Thorold Townline Road at a 0.5 m corrugated steel pipe. The upstream section exhibits a swale-like appearance, with very minimal definition, in which the farmer has planted winter wheat. Wetted and feature width ranges from 0.6 m to 0.7 m. Water depth ranges from 0.08 m to 0.10 m and velocities are estimated at 0.06 m/s. This feature gains minimal definition as it drains into the main channel to the southeast.

Photos: 3337, 3339, 3347, 3353

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 4, 2017
Staff Name:	Uskov, Faiella	Time:	13:12
Reach ID (use map):	9	Weather (current):	Overcast,
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☐ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☒ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☒ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☒ Cropped Land	☒ Cropped Land	☒ Cropped Land
☐ Meadow	☐ Meadow	☐ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

The upstream section of this feature originates as a ponded area from recent rains. It outflows through a very ill-defined swale feature in a planted agricultural field where wetted width is approximately 0.20 m wide. Minimal velocities observed at the time of the survey. Moving downstream (southeast), the swale gains minimal definition prior to the confluence with the main channel. In the downstream section, wetted width ranges from 0.65 to 0.75 and feature width ranges from 0.75 m to 0.85 m. Throughout, substrate is comprised of silt and clay.

Photos: 3355, 3358, 3363

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 4, 2017
Staff Name:	Uskov, Faiella	Time:	12:26
Reach ID (use map):	10	Weather (current):	Overcast,
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☐ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☒ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☐ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☒ Cropped Land	☒ Cropped Land	☒ Cropped Land
☐ Meadow	☐ Meadow	☐ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

The survey started at Thorold Townline Road and continued northeast to the main channel. Flow into the subject lands is conveyed through a 0.6 m corrugated plastic culvert. The upstream section is considered a swale that has been cropped through. Minimal flow velocities of approximately 0.10 m/s. Wetted width ranges from 0.85 m to 1.10 m and the feature width ranges from 0.85 m to 1.2 m. Water depth ranges from 0.05 m to 0.11 m. The widest section of this feature is located near the confluence with the main channel which is flooded. Substrate is comprised mainly of silt and clay.

Photos: 3307, 3309, 3313, 3321

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 4, 2017
Staff Name:	Uskov, Faiella	Time:	12:47
Reach ID (use map):	11	Weather (current):	Overcast,
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☐ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☒ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☒ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☐ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☐ Cropped Land	☒ Cropped Land	☒ Cropped Land
☐ Meadow	☐ Meadow	☐ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☒ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

Flow is generated on lands to the west of Thorold Townline Road. The upstream section of the survey starts in a hardwood woodlot at Thorold Townline Road. The feature in the upstream section is approximately 0.53 m wide (wetted width) with a feature width of 1.75 m. Water depths ranged from 0.05 to 0.7 m with water velocities estimated at 0.07 m/s. Moving downstream, the feature is an unvegetated swale that has been cropped through with an average wetted width of 1.0 m. Substrate is comprised of silt and clay.

Created: April 18, 2022

Photos: 3335, 3332, 3326

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 4, 2017
Staff Name:	Uskov, Faiella	Time:	13:44
Reach ID (use map):	12	Weather (current):	Overcast
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☐ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☒ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☐ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☒ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☐ Cropped Land	☐ Cropped Land	☒ Cropped Land
☒ Meadow	☒ Meadow	☒ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

This feature originates from a wetland feature in the southwest area of the subject lands. The riparian vegetation is scrubland/meadow species and the swale has moderate definition. Average wetted width is approximately 0.5 m with water depth ranging from 0.05 m to 0.08 m. Moving downstream (north), the feature becomes a cropped swale with no definition with wetted widths ranging from 0.75 m to 0.85 m and depths ranging from 0.05 m to 0.07 m. Substrate is comprised mainly of silt and clay.

Photos: 3371, 3373, 3376

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 4, 2017
Staff Name:	Uskov, Faiella	Time:	14:22
Reach ID (use map):	13	Weather (current):	Overcast,
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☐ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☒ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☐ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☒ Cropped Land	☒ Cropped Land	☒ Cropped Land
☐ Meadow	☐ Meadow	☐ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

The survey started at Uppers Lane where water flows through a 0.5 m plastic corrugated pipe into the feature. The entire reach is considered a cropped swale with minimal definition. The feature is 0.9 m wide and water depth is 0.07 m. Velocity is estimated at 0.05 m/s. Substrate is clay and silt with some sparse gravel overlying the clay surface.

Photos: 3388, 3390, 3391

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 9, 2021
Staff Name:	Burnett, Faiella	Time:	10:25
Reach ID (use map):	14	Weather (current):	Sun, cloud
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☒ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☐ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☐ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☒ Cropped Land	☒ Cropped Land	☒ Cropped Land
☐ Meadow	☐ Meadow	☐ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

This feature is considered an agricultural swale with no defined banks that conveys water during spring runoff. The feature is 0.15 m wide and has been recently tilled and will most likely be planted. The substrate is comprised of silt and clay. One small section of standing water associated with the main channel was observed during the survey.

Created: April 18, 2022

Photos: Photos of this feature are saved in a geo referenced format in the Stantec Arc GIS platform.

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 9, 2021
Staff Name:	Burnett, Faiella	Time:	10:51
Reach ID (use map):	15	Weather (current):	Sun, cloud
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☒ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☐ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☒ No Defined Feature
- ☐ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☒ Cropped Land	☒ Cropped Land	☒ Cropped Land
☐ Meadow	☐ Meadow	☐ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

This feature is considered an agricultural swale with no defined banks that conveys water during spring runoff. The swale has been tilled and has previously been planted with soybeans. Substrate is silt and clay.

Created: April 18, 2022

Photos: Photos of this feature are saved in a geo referenced format in the Stantec Arc GIS platform.

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 9, 2021
Staff Name:	Burnett, Faiella	Time:	11:00
Reach ID (use map):	16	Weather (current):	Sun, cloud
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☒ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☐ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☐ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☒ Cropped Land	☒ Cropped Land	☒ Cropped Land
☐ Meadow	☐ Meadow	☐ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

This feature is considered an agricultural swale with no defined banks that conveys water during spring runoff. The swale has been tilled and has previously been planted with soy beans. Substrate is silt and clay.

Created: April 18, 2022

Photos: Photos of this feature are saved in a geo referenced format in the Stantec Arc GIS platform.

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 9, 2021
Staff Name:	Burnett, Faiella	Time:	11:00
Reach ID (use map):	17	Weather (current):	Sun, cloud
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☒ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☐ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☐ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☒ Cropped Land	☒ Cropped Land	☒ Cropped Land
☐ Meadow	☐ Meadow	☐ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

This feature is considered an agricultural swale with no defined banks that conveys water during spring runoff. The swale has been tilled and has previously been planted with soybeans near Beechwood Road. Substrate is silt and clay.

Created: April 18, 2022

Photos: Photos of this feature are saved in a geo referenced format in the Stantec Arc GIS platform.

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 9, 2021
Staff Name:	Burnett, Faiella	Time:	11:00
Reach ID (use map):	18	Weather (current):	Sun, cloud
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☒ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☐ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☐ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☒ Cropped Land	☒ Cropped Land	☒ Cropped Land
☐ Meadow	☐ Meadow	☐ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

This feature is considered an agricultural swale with no defined banks that conveys water during spring runoff. The swale has been tilled and has previously been planted with soybeans. Substrate is silt and clay. A 0.4 m plastic corrugated culvert is located at Uppers Lane.

Created: April 18, 2022

Photos: Photos of this feature are saved in a geo referenced format in the Stantec Arc GIS platform.

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 9, 2021
Staff Name:	Burnett, Faiella	Time:	11:47
Reach ID (use map):	19	Weather (current):	Sun, cloud
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☒ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☐ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☐ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☒ Cropped Land	☒ Cropped Land	☒ Cropped Land
☐ Meadow	☐ Meadow	☐ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

This feature is considered an agricultural swale with no defined banks that conveys water during spring runoff. The swale has been tilled and has previously been planted with soybeans. Substrate is silt and clay.

Created: April 18, 2022

Photos: Photos of this feature are saved in a geo referenced format in the Stantec Arc GIS platform.

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 9, 2021
Staff Name:	Burnett, Faiella	Time:	12:25
Reach ID (use map):	20	Weather (current):	Sun, cloud
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☒ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☐ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☐ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☒ Cropped Land	☒ Cropped Land	☒ Cropped Land
☐ Meadow	☐ Meadow	☐ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

This feature is considered an agricultural swale with no defined banks that conveys water during spring runoff. The swale has been tilled and has previously been planted with soybeans. Substrate is silt and clay.

Created: April 18, 2022

Photos: Photos of this feature are saved in a geo referenced format in the Stantec Arc GIS platform.

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 9, 2021
Staff Name:	Burnett, Faiella	Time:	12:45
Reach ID (use map):	21	Weather (current):	Sun, cloud
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☒ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☐ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☐ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☒ Cropped Land	☒ Cropped Land	☒ Cropped Land
☐ Meadow	☐ Meadow	☐ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

This feature is considered an agricultural swale with no defined banks that conveys water during spring runoff. The swale has been tilled and has previously been planted with soybeans. Substrate is silt and clay.

Created: April 18, 2022

Photos: Photos of this feature are saved in a geo referenced format in the Stantec Arc GIS platform.

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 9, 2021
Staff Name:	Burnett, Faiella	Time:	12:42
Reach ID (use map):	22	Weather (current):	Sun, cloud
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☒ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☐ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☐ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☒ Cropped Land	☒ Cropped Land	☒ Cropped Land
☐ Meadow	☐ Meadow	☐ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

This feature is considered an agricultural swale with no defined banks that conveys water during spring runoff. The swale has been tilled and has previously been planted with soybeans. Substrate is silt and clay.

Created: April 18, 2022

Photos: Photos of this feature are saved in a geo referenced format in the Stantec Arc GIS platform.

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 9, 2021
Staff Name:	Burnett, Faiella	Time:	13:04
Reach ID (use map):	23	Weather (current):	Sun, cloud
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☒ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☐ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☐ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☐ Cropped Land	☐ Cropped Land	☐ Cropped Land
☒ Meadow	☒ Meadow	☒ Meadow
☐ Scrubland / Thicket	☒ Scrubland / Thicket	☒ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

Feature is outside of project lands but conveys flow to Feature 11. Feature is dry. A 0.5 m corrugated steel pipe is located at the road and conveys feature drainage as well as roadside ditch drainage. The east side culvert opening is dry and the west side of the culvert has a very small, shallow pool of standing water.

Created: April 18, 2022

Photos: Photos of this feature are saved in a geo referenced format in the Stantec Arc GIS platform.

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 9, 2021
Staff Name:	Burnett, Faiella	Time:	13:20
Reach ID (use map):	24	Weather (current):	Sun, cloud
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☒ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☐ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☐ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☐ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☐ Cropped Land	☐ Cropped Land	☐ Cropped Land
☒ Meadow	☒ Meadow	☒ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

This feature was surveyed at the southwest corner of the property. It is considered a meadow swale that was dry during the survey. No defined banks were observed. Grassed throughout feature. The roadside ditch was dry during the survey.

Created: April 18, 2022

Photos: Photos of this feature are saved in a geo referenced format in the Stantec Arc GIS platform.

Stantec

Unconstrained Headwater Drainage Feature Assessment Field Form

Project Number:	160961352	Date:	April 9, 2021
Staff Name:	Burnett, Faiella	Time:	13:42
Reach ID (use map):	25	Weather (current):	Sun, cloud
(Sub)Watershed:		Rainfall (72 hours prior):	
Location:	Uppers Quarry (Thorold, ON)		

Flow Condition

- ☒ No Surface Water (dry)
- ☐ Standing Water
- ☐ Interstitial Flow (subsurface water in the voids of a coarse substrate)
- ☐ Surface Flow Minimal (<0.5 l/s)
- ☐ Surface Flow Substantial (>0.5 l/s)

Feature Type

- ☐ Defined Natural Channel
- ☐ Channelized
- ☐ Multi-Thread (>1 Channel)
- ☐ No Defined Feature
- ☒ Swale (a shallow trough-like depression that carries water mainly during rainstorms or snow melts)
- ☒ Wetland
- ☐ Online pond outlet
- ☐ Roadside Ditch
- ☐ Tiled Drainage

Riparian Classification

0m-1.5m	1.5m-10m	10m-30m
☐ None	☐ None	☐ None
☐ Lawn	☐ Lawn	☐ Lawn
☐ Cropped Land	☐ Cropped Land	☐ Cropped Land
☒ Meadow	☒ Meadow	☒ Meadow
☐ Scrubland / Thicket	☐ Scrubland / Thicket	☐ Scrubland / Thicket
☐ Forest	☐ Forest	☐ Forest

Notes: (include o.a.: *water & air temp.; defined banks?; feature width; wetted width; culverts? (measurements); barriers to fish migration; seeps; ponds; amphibians; terrestrial crayfish; etc.*)

This feature was surveyed at the southwest corner of the property. It originates in a wetland that was dry during the survey. No defined banks were observed. Evidence of previous water pooling observed and marked by a patch of cracked earth.

Created: April 18, 2022

Photos: Photos of this feature are saved in a geo referenced format in the Stantec Arc GIS platform.

Stantec **Stantec Consulting Ltd.**
70 Southgate Drive, Suite 1, Guelph ON N1G 4P5

Photograph Log

Project Number: 160960948
Date: June 22/17
Project Name: Uppers Lane Quarry
Field Personnel: N. Burnett, M. Faiella.

Weather Conditions: (current) 22°C (TEMP (°C)) | None. (PRECIPITATION)

Photo No.	~~Time~~ Site.	Photo Description & Comments
3558	A2	view d/s
3559	↓	" u/s
3560	↓	channel
3561	A1	view d/s
3562	↓	view u/s
3563	↓	channel view
3564	↓	bank and channel
3565-66	confluence/d/s of feature 3+4 at field edge.	dry.
3572-73	feature 11.	dry.
3578	feature 8 - lower end	dry.
3579	feature 9 - into field	dry.
3580-3581	feature 10.	view from road - dry. - u/s view, d/s, view.
3567	A3	view u/s
3568	↓	" d/s
3569	↓	channel view
3570	↓	bank and channel
3571	↓	overview habitat.
3574	A4	view u/s
3575	↓	view d/s
3576	↓	channel view.
3577	↓	bank and overview.
3582-3583	feature 7	dry culvert (feature 12 is dry as a result).
	~~feature~~ feature 6	- dry - as noted from A4 - planted field
3584	feature 8 - at road	- dry.
3585-86	feature 2 - u/s, d/s	- dry.
3587-3588	feature 13 - u/s, d/s	- dry.
3589.	feature 1 - from road	- planted field - Dry.
3590	feature 5 - taken near u/s end of 4, into field	- dry.
3591-3592	feature 4 - u/s end near barn/shed structure	- dry.

☐ check box if log is continued on reverse side of this form

PAGE 1 OF ___

Print Name & Initial: N. Burnett (field notes author)

Quality Control: This form is complete ☐ & legible ☐

Print Name & Initial: _____ (field notes QA/QC personnel)

Photo 1: April 4, 2017 - Feature 1. Upstream location facing upstream of Uppers Lane (south)

Photo 2: April 4, 2017 - Feature 1. At Uppers Lane facing downstream (north)

Photo 3: April 4, 2017 - Feature 1. Downstream location at north property boundary facing downstream (north)

Photo 4: April 4, 2017 - Feature 1. Downstream location at north property boundary facing downstream (north)

Photo 5: April 4, 2017 - Feature 2. Upstream location facing upstream (south)

Photo 6: April 4, 2017 - Feature 2. Upstream location facing upstream (south)

Photo 7: April 4, 2017 - Feature 2. Downstream location at north property boundary facing downstream (north)

Photo 8: April 4, 2017 - Feature 3. Upstream location facing upstream (east)

Photo 9: April 4, 2017 - Feature 3. Mid-section facing upstream (east)

Photo 10: April 4, 2017 - Feature 3. Downstream section at confluence with Feature 4.

Photo 11: April 4, 2017 - Feature 3. Downstream section.

Photo 12: April 4, 2017 - Feature 4. Upstream location facing upstream (southeast)

Photo 133: April 4, 2017 - Feature 4. Upstream location facing downstream (northwest)

Photo 14: April 4, 2017 - Feature 4. Exposed tile drain. Facing downstream (northwest) at field crossover

Photo 15: April 4, 2017 - Feature 4. At downstream section facing downstream (northwest)

Photo 16: April 4, 2017 - Feature 5. At upstream location facing downstream (west)

Photo 17: April 4, 2017 - Feature 5. Downstream location near main channel, facing downstream (west)

Photo 18: April 4, 2017 - Feature 5. Downstream location near main channel facing upstream (east)

Photo 19: April 4, 2017 - Feature 6. At upstream location

Photo 20: April 4, 2017 - Feature 6. At mid-section facing upstream (east)

Photo 21: April 4, 2017 - Feature 6. At downstream section facing upstream (east)

Photo 22: April 4, 2017 - Feature 7. At upstream section facing downstream (east)

Photo 23: April 4, 2017 - Feature 7. At Thorold Townline Road facing north

Photo 24: April 4, 2017 - Feature 7. At downstream section facing downstream (east)

Photo 25: April 4, 2017 - Feature 8. At Thorold Townline Road.

Photo 26: April 4, 2017 - Feature 8. At upstream section facing downstream (east)

Photo 27: April 4, 2017 - Feature 8. At mid-section facing downstream (southeast)

Photo 28: April 4, 2017 - Feature 8. At confluence with main channel

Photo 29: April 4, 2017 - Feature 9. At upstream location facing upstream (northeast)

Photo 30: April 4, 2017 - Feature 9. At downstream location at confluence with main channel

Photo 31: April 4, 2017 - Feature 9. At mid-section facing upstream (northwest)

Photo 32: April 4, 2017 - Feature 10. At Thorold Townline Road.

Photo 33: April 4, 2017 - Feature 10. At upstream section facing upstream (west)

Photo 34: April 4, 2017 - Feature 10. At upstream section facing downstream (east)

Photo 35: April 4, 2017 - Feature 10. Downstream section facing upstream (west)

Photo 36: April 4, 2017 - Feature 11. At Thorold Townline Road

Photo 37: April 4, 2017 - Feature 11. Upstream section in woodlot facing downstream (east)

Photo 38: April 4, 2017 - Feature 11. Mid-section looking upstream (west) at woodlot

Photo 39: April 4, 2017 - Feature 12. At confluence with Feature 7 facing upstream (north)

Photo 40: April 4, 2017 - Feature 12. At mid-section

Photo 41: April 4, 2017 - Feature 12. At mid-section

Photo 42: April 4, 2017 - Feature 13. Immediately upstream of Uppers Lane facing upstream (south)

Photo 43: April 4, 2017 - Feature 13. At upstream section facing downstream (north)

Photo 44: April 4, 2017 - Feature 13. At upstream section facing upstream (south)

Photo 45: June 22, 2017 – Feature 1. At north property boundary facing downstream (north)

Photo 46: June 22, 2017 – Feature 1. Facing north from Uppers Lane

Photo 47: June 22, 2017 – Feature 2. At north property boundary facing downstream (north)

Photo 48: June 22, 2017 – Feature 3. Mid-section facing east

Photo 49: June 22, 2017 – Feature 4. Upstream section facing downstream (west)

Photo 50: June 22, 2017 – Feature 4. Upstream section facing downstream (northwest)

Photo 51: June 22, 2017 – Feature 5. Mid-section

Photo 52: June 22, 2017 – Feature 7. At Thorold Townline Road

Photo 53: June 22, 2017 – Feature 7. At Thorold Townline Road, looking east

Photo 54: June 22, 2017 – Feature 8. Main channel area looking upstream (west) at feature location

Photo 55: June 22, 2017 – Feature 8. At Thorold Townline Road facing downstream (east)

Photo 56: June 22, 2017 – Feature 9. Mid-section facing north

Photo 57: June 22, 2017 – Feature 10. Looking at east side of Thorold Townline Road facing upstream (west)

Photo 58: June 22, 2017 – Feature 10. At Thorold Townline Road facing downstream (east)

Photo 59: June 22, 2017 – Feature 11. Mid-section facing upstream (west) into woodlot

Photo 60: June 22, 2017 – Feature 11. Mid-section facing downstream (east)

Photo 61: June 22, 2017 – Feature 13. At Uppers Lane facing upstream (south) of road

Photo 62: June 22, 2017 – Feature 13. At Uppers Lane facing downstream (north) of road

Photo 63: April 9, 2021 – Feature 14. Facing upstream (east)

Photo 64: April 9, 2021 – Feature 14. Feature 14. Looking upstream (east) from edge of field near main channel

Photo 65: April 9, 2021 – Feature 14 looking west near main channel.

Photo 66: April 9, 2021 – Feature 15, which is upstream end of Feature 16, facing east.

Photo 67: April 9, 2021 – Feature 15 end Facing upstream (west)

Photo 68: April 9, 2021 – Feature 16. Downstream section facing upstream (west)

Photo 69: April 9, 2021 – Feature 16. Upstream section facing downstream (east)

Photo 70: April 9, 2021 – Feature 16. At confluence with Feature 1

Photo 71: April 9, 2021 – Feature 17. Looking downstream at Uppers Lane from south of road

Photo 72: April 9, 2021 – Feature 17. Approximately 100 m downstream (west) of Beechwood Road, facing downstream (north)

Photo 73: April 9, 2021 – Feature 17. At middle section facing upstream (south)

Photo 74: April 9, 2021 – Feature 18. At confluence with Feature 3 facing upstream (north)

Photo 75: April 9, 2021 – Feature 18. At upstream location facing downstream (south)

Photo 76: April 9, 2021 – Feature 18. Uppers Lane culvert

Photo 77: April 9, 2021 – Feature 19. At downstream location facing upstream (east)

Photo 78: April 9, 2021 – Feature 19. At mid-section facing upstream (east)

Photo 79: April 9, 2021 – Feature 19. At upstream location facing upstream (east)

Photo 80: April 9, 2021 – Feature 20. At upstream location facing east

Photo 81: April 9, 2021 – Feature 20. At upstream location facing west

Photo 82: April 9, 2021 – Feature 20. Downstream end looking east at main channel

Photo 83: April 9, 2021 – Feature 21. At downstream section facing west

Photo 84: April 9, 2021 – Feature 21. Facing east towards confluence with Feature 20

Photo 85: April 9, 2021 – Feature 21. Facing upstream (southwest)

Photo 86: April 9, 2021 – Feature 22. At downstream section near main channel, facing upstream (west)

Photo 87: April 9, 2021 – Feature 22. Facing upstream (northwest)

Photo 88: April 9, 2021 – Feature 22. At downstream section looking down stream (east) at main channel

Photo 89: April 9, 2021 – Feature 23. Upstream (west) side of Thorold Townline Road

Photo 90: April 9, 2021 – Feature 23. Looking upstream (west) of Thorold Townline Road

Photo 91: April 9, 2021 – Feature 24. From Thorold Townline Road, facing downstream (northeast)

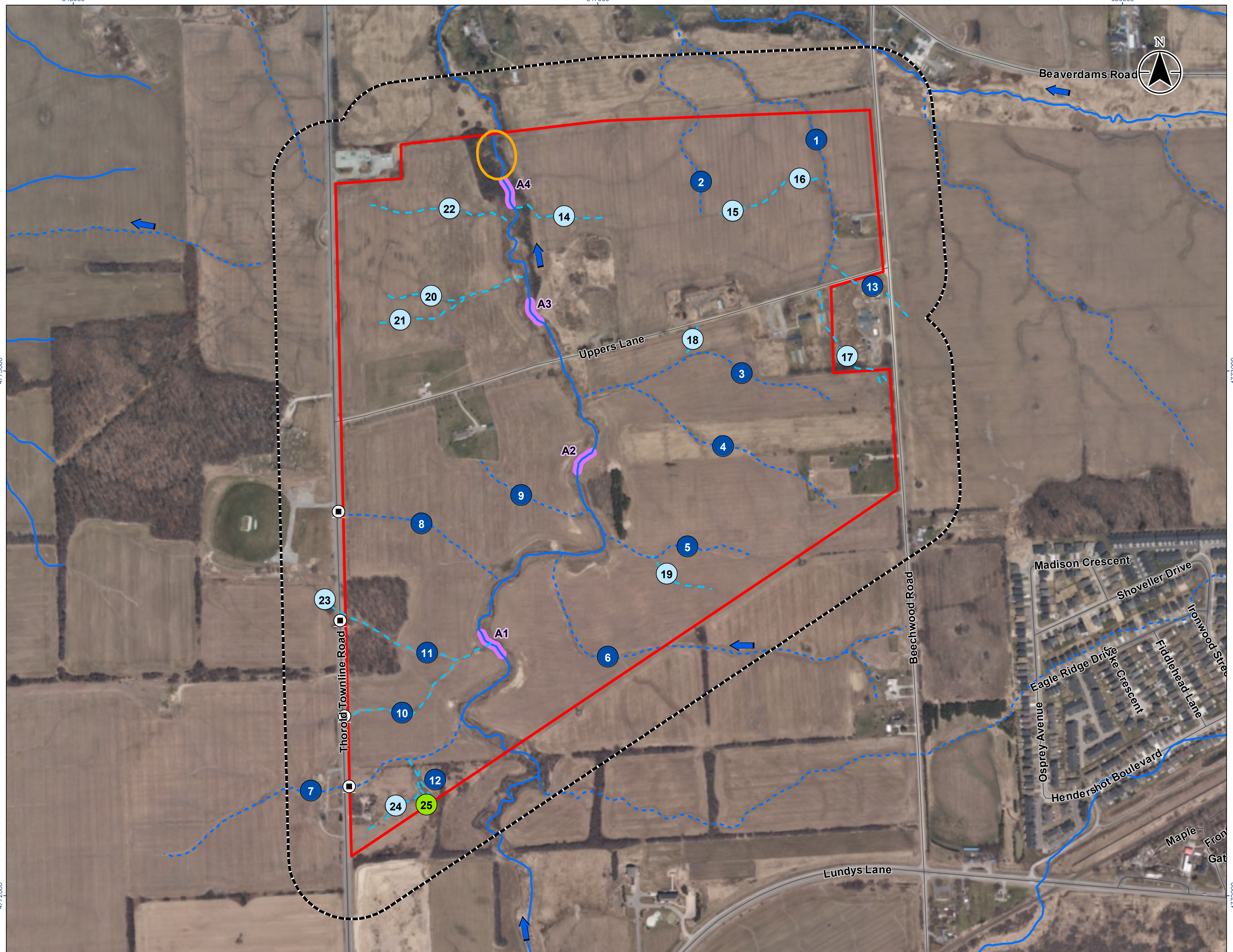
Photo 92: April 9, 2021 – Feature 24. At upstream section looking upstream (southwest) at Thorold Townline Road

Photo 93: April 9, 2021 – Feature 24. At middle section facing downstream (northeast)

Photo 94: April 9, 2021 – Feature 25. At downstream location looking east across)

Photo 95: April 9, 2021 – Feature 25. Downstream section looking upstream (south)

Photo 96: April 9, 2021 – Feature 25. Upstream (south) end.



Stantec

Legend

- Subject Property
- Study Area (120 m Zone of Investigation)
- Flow Direction
- Culvert
- Fish Community Survey Station
- Area of Shallow Overburden and Groundwater Discharge

Headwater Assessment Feature

- Mitigation
- No Management Required
- Protection
- Watercourse, LIO/ MNRF

Headwater Drainage Features

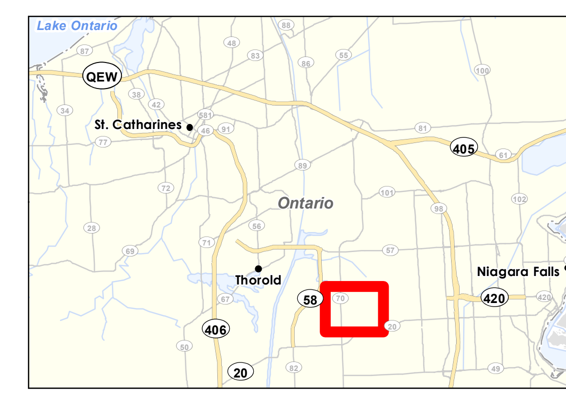
- Watercourse (Intermittent) LIO/MNRF
- Watercourse (Intermittent) Stantec

0 200 400 metres

1:7,500 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.
3. Orthoimagery © First Base Solutions, 2018. Imagery Date 2018.



Project Location
Regional Municipality of Niagara

160961352 REVA
Prepared by DH on 2024-04-18
Technical Review by PRM on 2023-08-25

Client/Project
WALKER AGGREGATES INC.
UPPERS QUARRY LEVEL 1 AND LEVEL 2 NATURAL ENVIRONMENT TECHNICAL REPORT AND ENVIRONMENTAL IMPACT STUDY

Figure No.
8

Title
Aquatic Study Locations